

CLAIMS

1. A data relay device, the device having
receiving means for receiving payload data from a data source,
5 a buffer for storing payload data for subsequent transmission,
means for receiving status data from similar devices,
status data generation means for generating status data, the status data being
derived from the quantity of data in the buffer store and the status data received from
other devices, and comprising data relating to
10 the separation of the device from other devices,
the quantity of data in the buffer store
means for determining a scalar status value determined by the quantity of data
stored in the buffer and its separation from nearby sensors,
status transmitter means for transmitting the status value to other devices
15 selection means for identifying, from the status data received from other devices,
a receiving device having a status value which varies from its own status value in a
manner indicative that payload data may be forwarded to it, and
payload transmission means for transmitting the payload data to the identified
receiving device.
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2. A data relay device according to claim 1, comprising means for receiving payload
data transmitted by other similar devices.
3. A data relay device according to claim 1 or claim 2, further comprising a data
25 source
4. A data relay device according to any preceding claim, wherein the selection
means is arranged to only identify a suitable receiving device if the scalar status value
meets one or more threshold criteria.
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5. A device according to claim 4, wherein a threshold criterion is that the remaining
battery power is at least sufficient to transmit all the data currently in the buffer.
6. A device according to claim 4 or 5, having means for selecting a threshold
35 criterion as a function of elapsed time from a predetermined start point.

7. A data relay device according to any preceding claim, further comprising condition-monitoring means for monitoring the expected lifetime of the device, and adjusting the scalar status value accordingly.
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8. A device according to any preceding claim, wherein the separation between devices is determined from the power required to make a transmission between them.
9. A device according to any preceding claim, comprising means for determining the
- 10 power that would be required to transmit payload data to an identified receiving device, and means for generating a scalar status value related to that power requirement.
10. A device according to claim 9, wherein the identified receiving device on which the power determination is based is the device selected for transmission on a previous
- 15 determination.
11. A device according to claim 9 or 10, wherein the scalar status value h is determined by the value $(N + k) C / B$
- 20 where N = number of packets of data currently in the buffer
 B = battery level
 C = power requirement of forwarding to the identified receiving device.
 k is a constant
12. A method of operating a plurality of data relay devices, comprising:
- 25 collecting data in buffer stores in one or more such devices,
exchanging status data between the devices, the status data comprising data relating to
- 30 the separation between the devices,
the quantity of data in their buffer stores
each device defining, from the status data, a scalar status value determined by the quantity of data stored in the buffer and its separation from other sensors
transmitting the status value to other devices and receiving the status values of other devices

identifying, from the status data received from other devices, a receiving device having a status value which varies from its own status value in a manner indicative that payload data may be forwarded to it, and

transmitting the payload data to the identified receiving device.

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13. A method according to claim 12, wherein data is only transmitted from a first device to a second device located in its forwarding direction if the scalar status value derived from the status data meets one or more predetermined threshold criteria.

10 14. A method according to claim 13, wherein a threshold criterion is that the remaining battery power is at least sufficient to transmit all the data currently in the buffer.

15. A method according to claim 12, 13 or 14, wherein the status data includes a measure of the expected lifetime of the device.

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16. A method according to claim 12, 13, 14 or 15 wherein payload data is transmitted, by means of one or more of the wireless relay devices, to a target sink device defined by a predetermined scalar status value.

20 17. A method according to claim 12, 13, 14, 15 or 16, wherein the power that would be required to transmit payload data to an identified receiving device is determined, and a scalar status value is generated related to that power requirement.

18. A method according to claim 17, wherein the identified receiving device on which
25 the power determination is based is the device selected for transmission on a previous determination.

19. A method according to claim 17 or 18, wherein the scalar status value h is determined by the value $(N + k) C / B$

30 where N = number of packets of data currently in the buffer

B = battery level

C = power requirement of forwarding to the identified receiving device

k is a constant